



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,108	04/16/2004	Shinji Matsumoto	023971-0400	7707
22428	7590	07/14/2006	EXAMINER	
FOLEY AND LARDNER LLP SUITE 500 3000 K STREET NW WASHINGTON, DC 20007			WEISKOPF, MARIE	
			ART UNIT	PAPER NUMBER
			3661	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/825,108	MATSUMOTO ET AL.	
	Examiner	Art Unit	
	Marie A. Weiskopf	3661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Allowable Subject Matter

1. The indicated allowability of claims 4-6 is withdrawn in view of the newly discovered reference(s) to Kobayashi (US 6,014,595). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 1-6, 15 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Kobayashi (US 6,014,595). Kobayashi discloses a determination of vehicle assistance from vehicle vibration that results when the vehicle contacts vibration generating structures on the road comprising:

- In regard to claim 1, an automotive lane deviation prevention apparatus comprising a processor programmed to perform the following:
 - Execute vehicle yawing motion control by which a host vehicle returns to a central position of a driving lane, when the host vehicle is traveling on predetermined irregularities formed on or close to either one of a left-hand side lane marking and a right-hand side lane marking line of the driving lane (Column 7, lines 48-58) that produce vibratory motion input into the host vehicle (Column 4, lines 48-59).

- In regard to claim 2, an automotive lane deviation prevention apparatus comprising a processor programmed to perform the following:
 - Determine whether a host vehicle is traveling on predetermined irregularities formed on or close to either one of a left-hand side lane marking and a right-hand side lane marking line of a driving lane that produce vibratory motion input into the host vehicle (Column 4, lines 48-59; Column 6, lines 63-66)
 - Execute vehicle yawing motion control by which the host vehicle returns to central position of the driving lane, when the host vehicle is traveling on the predetermined irregularities. (Column 7, lines 48-58)
- In regard to claim 3, the automotive lane deviation prevention apparatus further comprising:
 - Wheel speed sensors that detect respective wheel speeds of road wheels of the host vehicle (Column 6, lines 58-63)
 - Wherein the processor is further programmed for determining, based on signals from the wheel speed sensors, whether the host vehicle is traveling on the predetermined irregularities formed on or close to either one of the left-hand side lane marking line and the right-hand side lane marking line of the driving lane (Column 7, lines 3-25)
- In regard to claim 4, an automotive lane deviation prevention apparatus comprising:

Art Unit: 3661

- Wheel speed sensors that detect respective wheel speeds of road wheels of a host vehicle (Column 6, lines 58-63)
- A processor programmed to perform the following:
 - Determine that the host vehicle is traveling on predetermined irregularities formed on or close to either one of a left-hand side lane marking and a right-hand side lane marking line of the driving lane, when at least one of the wheel speeds detected by the wheel speed sensors is fluctuation at a substantially constant time period determined based on a host vehicle speed (Column 4, lines 48-59; Column 6, lines 63-66)
 - Execute a vehicle yawing motion control by which the host vehicle returns to a central position of the driving lane, when the host vehicle is traveling on the predetermined irregularities (Column 7, lines 48-58)
- In regard to claim 5, an automotive lane deviation prevention apparatus comprising:
 - Wheel speed sensors that detect respective wheel speeds of road wheels of a host vehicle (Column 6, lines 58-63)
 - A processor programmed to perform the following: determine that the host vehicle is traveling on predetermined irregularities formed on or close to either one of a left-hand side lane marking line and a right-hand side lane

marking line of a driving lane, only when either one of the left and right wheel speeds is fluctuating (Column 6, lines 28-41)

- In regard to claim 6, an automotive lane deviation prevention apparatus comprising:
 - A vehicle suspension up-and-down motion sensor that detects an up-and-down motion of a suspension of a host vehicle (Column 4, lines 53-55)
 - A processor programmed to perform the following:
 - Determine, based on the suspension's up-and-down motion detected, whether the host vehicle is traveling on predetermined irregularities formed on or close to either one of a left-hand side lane marking line and a right-hand side lane marking line of a driving lane (Column 6, lines 28-41)
 - Execute a vehicle yawing motion control by which the host vehicle returns to a central position of the driving lane, when the host vehicle is traveling on the predetermined irregularities. (Column 7, lines 48-58)
- In regard to claim 15, wherein the processor is further programmed for producing a steering torque in a direction in which the host vehicle returns to the central position of the driving lane, when the host vehicle is traveling on the predetermined irregularities formed on or close to either one of the left-hand side lane marking and the right-hand side lane marking line of the driving lane (Column 7, lines 48-58)

- In regard to claim 19, the automotive lane deviation prevention apparatus further comprising a control system that determines that the host vehicle is traveling on the predetermined irregularities formed on or close to either one of the left-hand side lane marking line and the right-hand side lane marking line of a driving lane that produce vibratory motion input into the host vehicle (Column 6, lines 42-67), and initiates the processor to execute vehicle yawing motion when a determination is made that the host vehicle is traveling on the predetermined irregularities formed on or close to either one of a left-hand side lane marking line and a right-hand side lane marking line of a driving lane that produce vibratory motion input into the host vehicle. (Column 7, lines 48-58)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US 6,014,595) in view of Kinoshita et al (US 6,057,754). Kobayashi is discussed above and Kinoshita et al discloses a drive assist system for motor vehicles. Kobayashi fails to disclose determining whether the host vehicle is traveling within an area except road-ways and inhibiting a check for the host vehicle traveling on the predetermined irregularities when the host vehicle is traveling within the area except road-ways. Kinoshita et al, however, discloses a warning signal generation judging

means for outputting a signal to stop or suppress an alarm when the vehicle moves out from the lane and least when it is judged based on the information obtained from the running environment judging section that an object exists on the lane. (Column 3, lines 20-26) It would have been obvious to one having ordinary skill in the art at the time of the invention to include the capability of inhibiting a check for the host vehicle traveling on the predetermined irregularities when the vehicle is traveling within an area except road-ways because a vehicle may be traveling in a very bumpy area which would cause the vehicle to keep compensating for the vibrations. Kinoshita et al discusses that there are cases where the drivers can be required to negotiate roads with pedestrians or vehicles and from that the driver may have to move in and out of lanes often (Column 1, lines 36-44).

6. Claims 8-10 and 16 rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US 6,014,595) in view of Satoh et al (US 6,489,887). Kobayashi is discussed above and Satoh et al discloses a lane-keeping assisting system for a vehicle.

- In regard to claim 8, Kobayashi fails to disclose a picture image pick-up device that detects the lane marking lines on the road. Satoh et al discloses:
 - A picture image pick-up device that captures a picture image in front of the host vehicle (Column 2, lines 31-42)
 - A lane marking detector that detects the lane marking line based on the picture image captured by the picture image pick-up device (Column 2, lines 31-42)

- Wherein the processor is further configured for:
 - Determining, based on the lane marking line detected, whether the host vehicle tends to deviate from the lane (Column 2, lines 51-55)
 - Executing lane deviation prevention (LDP) control by which the host vehicle's lane deviation tendency is avoided, in presence of the host vehicle's lane deviation tendency (Column 5, lines 30-34)

It would have been obvious to one having ordinary skill in the art at the time of the invention to include the picture image pick-up device as taught by Satoh et al to the invention taught by Kobayashi in order to provide a system which is capable of determining if the vehicle is deviating from the lane in multiple situations. Kobayashi discusses that the invention can be modified with already in place vehicle assistance systems to better determine the driving situation. (Column 8, lines 30-37) As discussed in Kobayashi, snow or ice may develop on the highway and the vibration markers may not be felt as readily but with the image capturing means, the invention would still be able to detect the lane markers and keep the vehicle on the road. (Column 8, lines 60-67)

- In regard to claim 9, Kobayashi fails to disclose compensating for a control gain for the LDP control in a direction that a desired yaw moment to be exerted on the host vehicle increases, when the host vehicle is traveling on the predetermined irregularities formed on or close to either one of the left-hand side lane marking line and the right-hand side lane marking line of the driving lane and additionally

in presence of the host vehicle's land-deviation tendency. (Column 5, lines 30-35)

- In regard to claim 10, Kobayashi discusses detecting a host vehicle speed as discussed above but fails to disclose detecting a host vehicle's yaw angle. Satoh et al discloses:
 - Detecting a host vehicle speed, a host vehicle's yaw angle with respect to a direction of the host vehicle's driving lane, a host vehicle's lateral displacement from a central axis of the host vehicle's driving lane, and a curvature of the host vehicle's driving lane (Column 3, lines 5-13)
 - Calculating a future lateral-displacement estimate based on the host vehicle speed, the yaw angle, the lateral displacement, and the curvature (Column 6, lines 8-11)
 - Determining that the host vehicle tends to deviate from the driving lane, when an absolute value of the future lateral-displacement is greater than or equal to a predetermined lateral-displacement criterion. (Column 6, lines 50-57)

It would have been obvious to one having ordinary skill in the art at the time of the invention to incorporate the invention as taught by Satoh et al with the invention of Kobayashi for the same reasons as discussed above, in order to provide a system which is capable of determining if the vehicle is deviating from the lane in multiple situations.

- In regard to claim 16, Kobayashi discloses an automotive lane deviation prevention apparatus comprising:
 - Sensors that detect whether a host vehicle is traveling on predetermined irregularities formed on or close to either one of a left-hand side lane marking and a right-hand side lane marking line of a driving lane that produce vibratory motion input into the host vehicle (Column 4, lines 48-59; Column 6, lines 63-66)
 - A road-surface irregularities detection means for determining, based on the signals from the sensors, whether the host vehicle is traveling on predetermined irregularities (Column 7, lines 3-25)
 - Vehicle yawing motion control means for executing vehicle yawing motion control by which the host vehicle returns to a central position of the driving lane, when the road-surface irregularities detection means determines that the host vehicle is traveling on the predetermined irregularities. (Column 7, lines 48-58)

Kobayashi fails to disclose specifically a yawing-motion control actuator that adjusts a yaw moment exerted on the host vehicle and a control unit being configured to be electronically connected to the yawing motion control actuator and the sensors for controlling the yawing motion of the host vehicle in response to signals from the sensors for yawing motion control purposes, however, Satoh et al discloses this. (Column 5, lines 30-63) It would have been obvious to one having ordinary skill in the art at the time of the invention to include the yawing

Art Unit: 3661

motion control as discussed by Satoh et al because this is commonly known in the art and Kobayashi does discuss returning the vehicle to the center of the lane, however, just does not specifically discuss using the yaw motion control.

7. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satoh et al (US 6,489,887) as applied to claims 8 and 10 above, and further in view of Matsuda (US 6,216,079). Kobayashi and Satoh et al are discussed above and Matsuda discloses a vehicle behavior control system.

- In regard to claims 11 and 12, Kobayashi discussed being able to brake a vehicle in order to prevent an accident from the lane deviation, Kobayashi does not specifically disclose calculating a braking/driving force. Matsuda discloses:
 - Calculating a braking/driving force controlled by variable of each of the road wheels so that a yaw moment is produced in a direction in which the host vehicle's lane-deviation tendency is avoided, in presence of the host vehicle's lane-deviation tendency (Column 8, lines 23-25; Column 8, line 61 – Column 9, line 7)
 - Controlling braking/driving forces of the road wheels, responsively to the braking/driving force controlled variables calculated (Column 8, lines 23-25; Column 8, line 61 – Column 9, line 7)
 - Calculating, based on a difference between the future lateral-displacement estimate and the predetermined lateral-displacement criterion, a desired yaw moment to be exerted on the host vehicle (Column 12, lines 1-10)

- o Calculating, based on the desire yaw moment, the braking/driving force controlled variable of the road wheels (Column 12, lines 1-10)

It would have been obvious to one having ordinary skill in the art at the time of the invention to include the vehicle behavior control system as taught by Matsuda with the Kobayashi invention in order to be able to brake the vehicle depending upon the yaw moment and the shape of the road as discussed by Matsuda (Abstract). Kobayashi discusses the need to brake the vehicle but does not dive into specifics on how it would be done.

8. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US 6,014,595) in view of Matsuda (US 6,216,079). Both Kobayashi and Matsuda are discussed above. Kobayashi discloses braking a vehicle when deviation is determined, however, does not specifically disclose calculating the brake force necessary. (Column 7, lines 48-58) Matsuda does disclose controlling a braking force of each of road wheels so that a yaw moment is produced in a direction in which the host vehicle returns to a central position of the driving line, when the host vehicle is traveling on the predetermined irregularities formed on or close to either one of the left-hand side lane marking line and the right-hand side lane marking line of the driving lane, calculating a braking/driving force controlled variable of each of the road wheels so that a predetermined constant yaw motion is produced in a direction in which the host vehicle returns to the central position of the driving lane, when the host vehicle is traveling on the predetermined irregularities formed on or close to either one of the left-hand side lane marking line and the right-hand side lane marking line of the driving lane.

(Column 2, lines 14-17) It would have been obvious to one having ordinary skill in the art at the time of the invention to include the vehicle behavior control system as taught by Matsuda with the Kobayashi invention in order to be able to brake the vehicle depending upon the yaw moment and the shape of the road as discussed by Matsuda (Abstract). Kobayashi discusses the need to brake the vehicle but does not dive into specifics on how it would be done.

9. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US 6,014,595) in view of Pilutti et al (US 6,021,367). Kobayashi is discussed above and Pilutti et al discloses a vehicle steering system and method for controlling vehicle direction through differential braking of left and right road wheels.

- In regard to claim 17, Kobayashi discloses a method of preventing lane deviation of a host vehicle employing braking force actuators that adjust braking forces applied to respective road wheels, the method comprising:
 - Detecting whether the host vehicle is traveling predetermined irregularities formed on or close to either one of a left-hand side lane marking line and a right-hand side lane marking line of a driving lane that produce vibratory motion input into the host vehicle (Column 4, lines 48-59; Column 6, lines 63-66)

Kobayashi, however, fails to disclose executing lane deviation prevention control by feedback-control of the braking force applied to the road wheels so that the host vehicle returns to a central position of the driving lane, when the host vehicle is traveling on the predetermined irregularities. Pilutti et al, however, discloses

this. (Column 6, lines 42-50) It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the braking force of Pilutti et al with the invention as discussed by Kobayashi in order to provide the braking control discussed in Kobayashi (Column 7, lines 48-58).

10. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US 6,014,595) in view of Kawazoe et al (US 2002/0013647). Kobayashi is discussed above and Kawazoe et al discloses a lane following vehicle control.

- In regard to claim 18, Kobayashi discloses a method of preventing lane deviation of a host vehicle employing breaking force actuators that adjust braking forces applied to respective road wheels, the method comprising:
 - Detecting whether the host vehicle is traveling predetermined irregularities formed on or close to either one of a left-hand side lane marking line and a right-hand side lane marking line of a driving lane that produce vibratory motion input into the host vehicle (Column 4, lines 48-59; Column 6, lines 63-66)

Kobayashi, however, fails to disclose executing lane deviation prevention control by feedback-control of the steering torque applied to the steering wheels so that the host vehicle returns to a central position of the driving lane, when the host vehicle is traveling on the predetermined irregularities. Kawazoe et al discloses this. (Page 3, paragraph 44) It would have been obvious to one having ordinary skill in the art at the time of the invention to combine the steering control of

Kawazoe et al with the invention as discussed by Kobayashi in order to provide the steering correction discussed in Kobayashi (Column 7, lines 48-58).

Response to Arguments

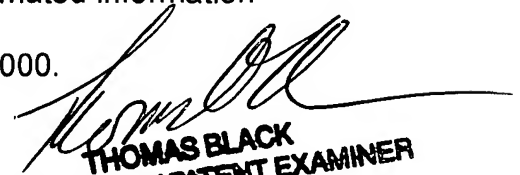
11. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marie A. Weiskopf whose telephone number is (571) 272-6288. The examiner can normally be reached on Monday-Thursday between 7:00 AM and 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Black can be reached on (571) 272-6956. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


THOMAS BLACK
SUPERVISORY PATENT EXAMINER